REMARKS

Claims 4-8, 10, 11, 13-15, and 17-19 are pending in the application.

By the foregoing Amendment, claims 13 and 19 are amended, and claims 2, 3, and 12 are canceled without prejudice or disclaimer. Claim 19 is amended to incorporate the limitations of claims 2, 3, and 12. Claim 13 is amended to change "a slurry discharge port" to "the slurry discharge port," as antecedent basis for recitation of "the slurry discharge port" is provided in claim 19. Claims 13 and 19 also are amended as discussed below in order to overcome the rejections under section 112.

These changes are believed not to introduce new matter, and entry of the Amendment is respectfully requested.

Based on the above Amendment and the following Remarks, Applicant respectfully requests that the Examiner reconsider all outstanding rejections, and withdraw them.

Rejection under 35 U.S.C. § 112, ¶ 2

In section 2 of the Office Action, claims 2-8, 10-15, 18, and 19 were rejected under section 112, second paragraph, as being indefinite due to the limitation "without removing foam from the gypsum slurry." This rejection is overcome by the foregoing amendments to claims 13 and 19 to delete the limitation "without removing foam from the gypsum slurry."

Rejection under 35 U.S.C. § 112, ¶ 1

In section 4 of the Office Action, claims 2-8, 10-15, 18, and 19 were rejected under section 112, first paragraph, as failing to comply with the written description requirement with respect to the phrases "being constructed for" and "without removing foam from the gypsum

slurry" in the limitation "the hollow connector section being constructed for providing said continuous flow without removing foam from the gypsum slurry" in claim 19, and with respect to the phrase "without removing foam from the gypsum slurry" in the limitation "displacing the gypsum slurry from said mixing area to said chute section via said hollow section without removing foam from the gypsum slurry" in claim 13. This rejection is overcome by the foregoing amendment to claim 19 to delete the limitation "the hollow connector section being constructed for providing said continuous flow without removing foam from the gypsum slurry"; and by the foregoing amendment to claim 13 to delete the limitation "without removing foam from the gypsum slurry."

Rejections under 35 U.S.C. § 102

In section 7 of the Office Action, claim 19 was rejected under section 102(b) as being anticipated by Phillips *et al.* (US 5,879,486). This rejection is overcome by the foregoing amendments to claim 19 to add the limitations of claims 2, 3, and 12.

Rejections under 35 U.S.C. § 103

In section 8 of the Office Action, claims 2-8, 10-14, and 19 were rejected under section 103(a) as being unpatentable over Hauber *et al.* (US 6,878,321) in view of Miura *et al.* (US 6,193,408) and Sucech *et al.* (US 5,683,635); in section 9, claims 15 and 18 were rejected under section 103(a) as being unpatentable over Hauber *et al.* in view of Miura *et al.* and Sucech *et al.*, and further in view of Seecharan *et al.* (US 6,190,476). To the extent the Examiner may consider these rejections to be applicable to amended claim 19, which now incorporates the limitations of claims 2, 3, and 12, and to the claims depending therefrom, they are respectfully

traversed as being based on a combination of references that does not teach or suggest the claimed invention.

The Office Action concedes that "Hauber et al. does not recite mixer 30 having a 'hollow connecting section' and 'chute section,' which feeds gypsum slurry having 'stable density and pressure,'" and cites Miura et al. as supplying the missing elements, characterizing Miura et al.'s outlet chute 45 as corresponding to the recited "hollow connecting section" and Miura et al.'s slurry discharge conduit 41 as corresponding to the recited "chute section."

The Office Action also apparently concedes that Hauber et al. does not teach a "slurry fractionation port," in that it states on page 7:

> With respect to "slurry fractionation port", it would have been obvious to one of ordinary skill in the art to provide the slurry discharge conduit 41 (chute section) of the mixer described by Miura et al with a "slurry fractionation port" since (1) Hauber et al teaches providing one mixer discharge leading to dual controllers for controlling the discharge of two or more outlets (col. 11 lines 20-25) and (2) Sucech et al shows using a "slurry fractionation port" to provide one mixer discharge 44 leading to two conduits 46,48 (Figure 1).

From the comments regarding the invention and the prior art made in the Office Action, it appears that the Examiner makes the following assumptions with respect to mixers for preparing gypsum slurry for the production of gypsum boards:

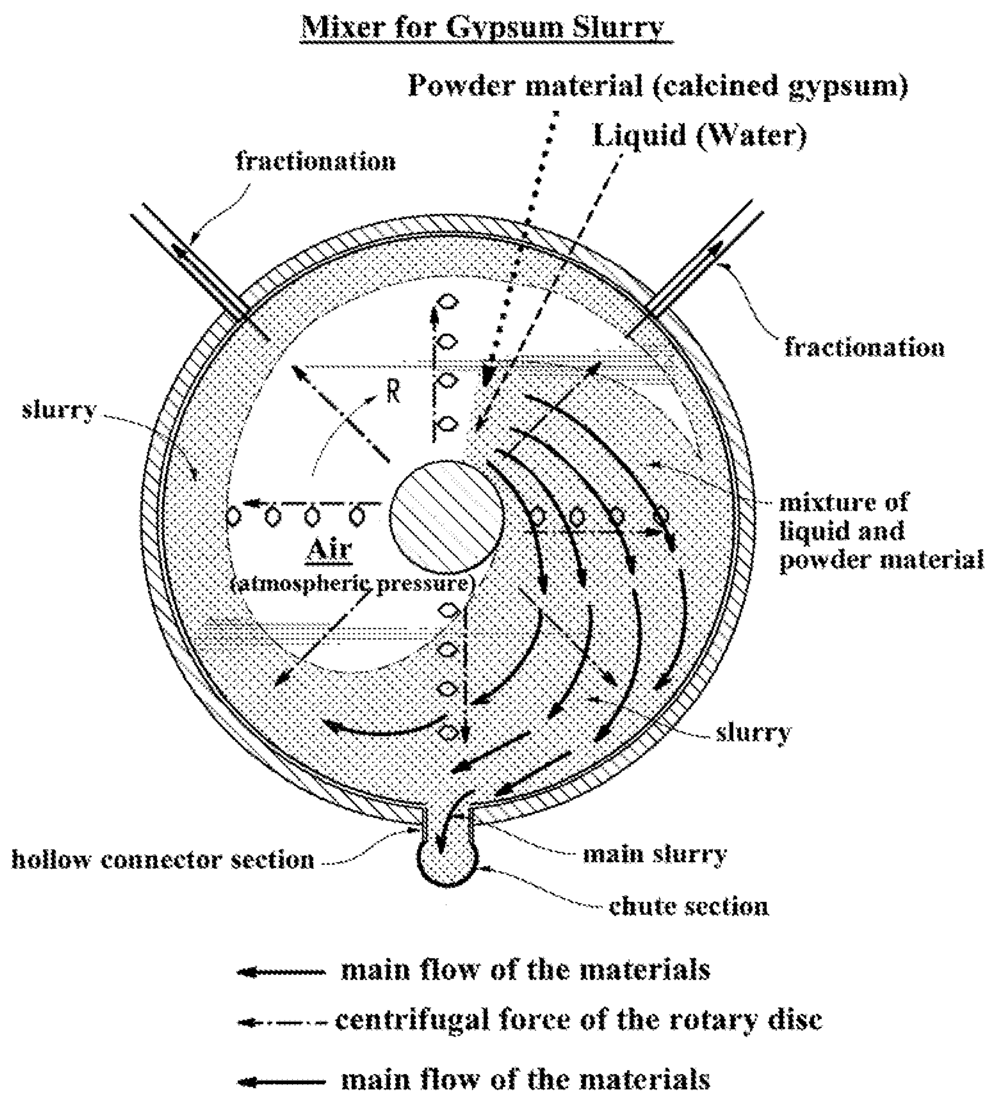
(1) the internal (mixing) area of the mixer is filled with the gypsum slurry; and

(2) an internal pressure for expelling or displacing the slurry from the mixer exists as a static pressure in the internal (mixing) area of the mixer.

Mixers with such characteristics would be quite different from the prior art mixers (such as that of Miura *et al.* (USP No. 6,193,408)) conventionally used for preparing the gypsum slurry, which mix calcined gypsum and water for producing gypsum slurry (referred to hereinafter as "conventional mixers").

As is well-known in the art, a conventional mixer, which is fed with calcined gypsum and water, does not have means for pressurizing the internal (mixing) area. If the internal (mixing) area of the mixer were pressurized to have a static pressure in the air or slurry, it would be difficult to feed the powder material (calcined gypsum) thereinto.

The drawing below is a horizontal cross-section of a conventional mixer as shown in Figure 6 of Miura *et al*, in which the conventional fractionation ports and movement of fluidic matter in the mixer have been labeled.

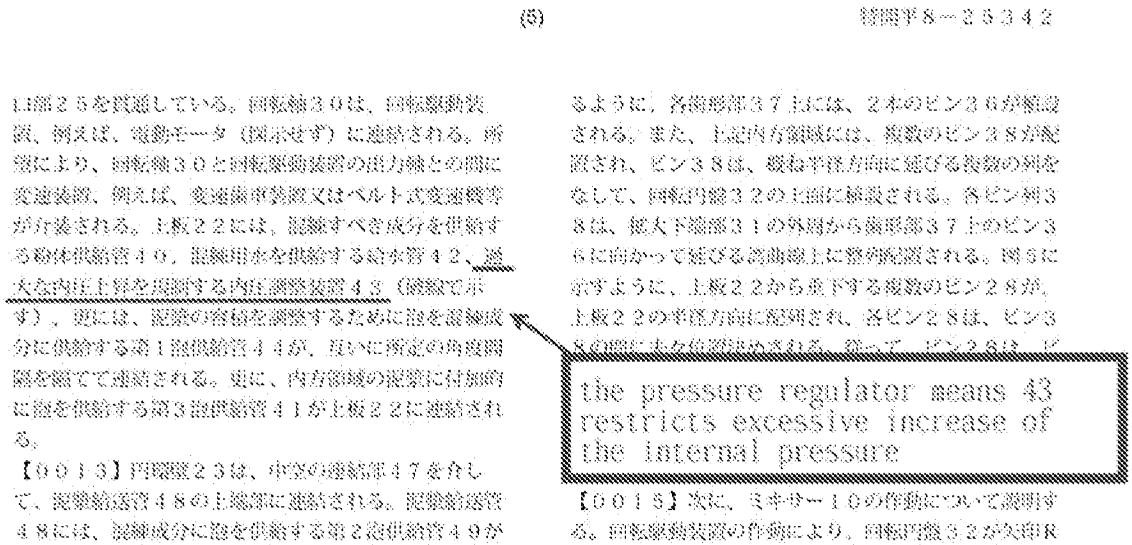


As can be seen from the above drawing, the conventional mixer has the following basic arrangement:

(1) Air, liquid (water), powder material (calcined gypsum), a mixture of the liquid and powder material, and slurry are present in the internal (mixing) area. About 50 percent of the volume of the internal space is occupied by the air, which is not pressurized. The pressure of the air is substantially the same as atmospheric pressure, and the internal pressure of the conventional mixer is almost the same as the atmospheric pressure.

(2) The liquid and powder material fed into the conventional mixer are stirred and mixed by rotation of the disc, and moved radially outward on the rotary disc by the centrifugal force of the rotary disc, and the slurry is discharged or expelled from the periphery of the conventional mixer by the action of centrifugal force of the rotary disc.

(3) If necessary, the conventional mixer has pressure regulator means such as the pressure regulator means 43 as disclosed in Miura *et al*. (Miura *et al*. describes "pressure regulator means 43 for controlling the internal pressure" at column 5, lines 50-51). The pressure regulator means prevents the internal pressure from being excessively and unexpectedly increased over the atmospheric pressure by movement of fluidic materials in the conventional mixer. Japanese Patent Laid-Open Publication No. 8-25342, which is the Japanese counterpart of Miura *et al*., explicitly explains that the pressure regulator means 43 restricts the excessive increase of the internal pressure. The relevant portion of Japanese Patent Laid-Open Publication No. 8-25342 is reproduced below, annotated with its English translation.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the pressure regulator means 43 restricts excessive increase of the internal pressure

The present application also explains (in paragraph [00050] of the published application) that in Japanese Patent Laid-Open Publication No. 8-25342, the pressure regulator means 47 restricts increase of the internal pressure.

The pressure of the conventional mixer and the conventional way in which fractionation is carried out will now be explained.

As described above, the internal (mixing) area of the conventional mixer is not pressurized and the conventional mixer does not have an internal pressure (static pressure) for expelling or displacing the slurry therefrom. It is impossible to expel or discharge the slurry from the top or upper wall of the housing of the conventional mixer.

Therefore, *in a conventional mixer, the discharge port and the fractionation port are located* <u>*on the annular outer wall*</u> *of the mixer housing* so as to radially expel or discharge the slurry by the centrifugal force of the rotary disc. The slurry flowing into and through the ports derives a dynamic pressure for flowing movement from the centrifugal force of the disc, as described in the specification of the present application (paragraph [0005] of the published application). The slurry flows through the port and a delivery tube under the dynamic pressure

of the slurry to reach the outlet of the tube. However, the dynamic pressure merely makes it possible to split or deflect the stream of the slurry, depending on the velocity components of movement of the slurry, as shown in the branch passage of Sucech *et al.* (USP 5,683,635).

The slurry in the chute section and the hollow connector section also has a dynamic pressure deriving from the centrifugal force of the disc. However, the movement of the slurry in the chute section is a swirling and gravitationally downward motion, and therefore, it is almost impossible to split or deflect the stream of the slurry, depending on the velocity components of movement of the slurry.

Further, the hollow connector section between the chute section and the annular outer wall of the conventional mixer does not have enough space for splitting or deflecting the stream of the slurry, depending on the velocity components of movement of the slurry.

Thus, the conventional mixer is arranged to fractionate the slurry from the port opening on the annular outer wall of the conventional mixer housing (the conventional mixer of Sucech *et al.* also has such a port 44), so that fractionation results from the centrifugal force of the disc or the dynamic pressure deriving from the centrifugal force of the disc.

The concept of the present invention will now be explained.

Fractionation of the slurry can be carried out independent of the velocity components of movement of the slurry if the effective static pressure of the slurry is sufficient to fractionate the slurry. However, prior to the present invention, it was unknown where such an effective static pressure could be obtained, much less that such an effective static pressure exists in the chute section and the hollow connector section.

The present invention is based on the following discoveries made by the inventors:

(1) An effective static pressure of the slurry, which is sufficient to fractionate the slurry independent of the velocity components of movement of the slurry, exists *in the chute section and the hollow connector section*.

(2) Fractionation of the slurry at the chute section and/or the hollow connector section enables reliable control of the density of the gypsum slurry to be fractionated from the mixer. This results in restriction of change in the flow rate of the fractionated slurry, and reduction in the consumption of foam or foaming agent. Therefore, the object of the present invention as described in the specification of the present application (paragraph [00014]) can be attained.

As explained above, *in a conventional mixer such as that of Miura et al.*, the slurry is radially expelled or discharged by the centrifugal force of the rotary disc, because in the absence of an internal pressure (static pressure), it is impossible to expel or discharge the slurry from the top or upper wall of the housing. Therefore, *in Miura et al. or any other conventional mixer, the discharge port and the fractionation port must be located <u>on the annular outer wall</u> of the mixer housing*.

In contrast, in the present invention as recited in claim 19, fractionation is carried out by the static pressure independent of the velocity components of the movement of the slurry, as a result of the following structural features: (1) The discharge port is in the chute section, the hollow connector section has an outlet end opening directly to the chute section for providing a continuous flow of the gypsum slurry from the mixing area into the chute section by pressure of the mixer only, and *the slurry fractionation port is disposed <u>on a top wall</u> of at least one of the chute section and the hollow connector section*. (2) A valve is provided for opening and closing the slurry fractionation port, and for controlling the pressure of the slurry fractionated through the slurry fractionation port. (3) A casing is provided, which encloses the slurry fractionation port and the valve and which has a slurry delivery port, wherein the slurry delivery conduit is connected to the slurry delivery port so as to be in fluid communication with the slurry fractionation port through an internal area of the casing.

Finally, Applicant wishes to address the following conclusions set forth on page 7 of the Office Action:

> When viewed as a whole, the applied prior art to Hauber et al, Miura et al and Sucech et al suggest using Miura et al's mixer 10 as mixer 30 in Hauber et al's method 1 apparatus and providing a "slurry fractionation port" on the slurry discharge conduit 41 such that part of the slurry flows through the "slurry fractionation port" and then through controller 36 and outlet 34 and the remainder of the slurry flows through controller 46 and outlet 134… It is emphasized that there is no difference between Miura et al's mixer, outlet chute 45 and slurry discharge conduit 41 and the claimed mixer, hollow connector section and chute section.

In the prior art, the slurry has to flow through the fractionation port and the delivery tube to reach an outlet of the tube. It therefore follows that the flowing slurry has a dynamic pressure depending on a velocity of movement of the slurry.

Similarly in the present invention, the fractionated slurry has a dynamic pressure for flowing through the fractionation port and the delivery tube to reach the outlet of the tube, similarly to the prior art mixers.

The present invention is different from the prior art because of differences in what acts to fractionate the slurry and what gives such a dynamic pressure to the slurry.

As explained above, the static pressure in the mixer is substantially the same as the atmospheric pressure. In the prior art mixers, fractionation is caused by the centrifugal force of the disc and the dynamic pressure is imparted to the fractionated slurry by the centrifugal force. This is apparent from the fact that an upward fractionation from the top or upper wall of the mixer housing cannot be carried out.

On the other hand, in the present invention, fractionation is caused by the static pressure generated in the chute section or the hollow connector section and the dynamic pressure is imparted to the fractionated slurry by the static pressure.[*] This is apparent from the fact that the upward fractionation from the top or upper wall of the chute section or the hollow connector section can be carried out as shown in Figure 6.

The conclusions set forth on page 7 of the Office Action ignore the difference between the dynamic pressure and the static pressure, as well as the fact that the internal pressure (static pressure) for fractionation does not exist in the mixing area (internal area) of the mixer.

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[*] The total pressure of a fluid consists of a dynamic pressure and a static pressure. The dynamic pressure is merely a function of the velocity of a fluid, and *the term of "pressure" of a fluid usually means (as it does in the case of the present application) the "static" pressure,* as is apparent from Bernoulli's Principle. Background information on Bernoulli's Principle is attached hereto as an Appendix.

The difference between the dynamic pressure and the static pressure is important, and cannot be ignored.

In view of the foregoing, it is respectfully submitted that the invention as recited in claim 19, and the claims depending therefrom, is patentable over the cited prior art; and that the rejection should be withdrawn.

Conclusion

All rejections have been complied with, properly traversed, or rendered moot. Thus, it now appears that the application is in condition for allowance. Should any questions arise, the Examiner is invited to call the undersigned representative so that this case may receive an early Notice of Allowance.

Favorable consideration and allowance are earnestly solicited.

Respectfully submitted,

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Enclosures: **Appendix**
Request for Continued Examination Transmittal
Petition for Extension of Time